

Cystopteris fragilis in the Western Himalayas

S. S. BIR and CHANDER K. TRIKHA*

While working out the taxonomy of the genus *Cystopteris* Bernh. in India, Bir and Trikha (1973) segregated *C. fragilis* (L.) Bernh. into two forms in addition to f. *fragilis*. In the present paper the new forms are described and typified in conformity with the "International Code of Botanical Nomenclature." These forms can be distinguished using the following key:

KEY TO CYSTOPTERIS FRAGILIS IN THE WESTERN HIMALAYAS

1. Spores granulose 2. *C. fragilis* f. *granulosa*
1. Spores echinate.
 2. Pinnules oblong, rhomboidal, obtuse at the apex, the lobes blunt and shallowly toothed. 1. *C. fragilis* f. *fragilis*
 2. Pinnules narrowly oblong, acute at the apex, the lobes acutely toothed. 3. *C. fragilis* f. *himalayensis*

1. *Cystopteris fragilis* f. *fragilis*.

Figs. 1A, B.

ILLUSTRATIONS: Blasdell (1963, p. 81, pl. 2A-G), Bir and Trikha (1973, pp. 12-13, figs. 1-5).

SPECIMENS EXAMINED:

CANADA: Quebec: Corniche de grès, entre Bradore et Blanc Sablon, 6 Sept 1957, A. Hende, H. Generux & P. Deslauriers (PAN 3035). INDIA: Himachal Pradesh: Rohtang Pass, Kulu valley, western Himalayas, 3900 m, July 1966, S. P. Khullar (PAN 5393).

2. *Cystopteris fragilis* f. *granulosa* Bir & Trikha, f. nov.

Figs. 2A, B.

A *Cystopteride fragili* f. *fragili* sporis granuloso-verrucosis differt.

Stipes stramineous to light brown, glossy, usually equal to or longer than the laminae; fronds 15-30 cm long, 4-8 cm wide; laminae linear-lanceolate to broadly ovate-lanceolate, resembling *C. fragilis* f. *fragilis* in frond outline, the pinnules broad with an obtuse apex; spores granular and warty.

ILLUSTRATIONS: Bir and Trikha (1973, pp. 13-15, figs. 6-7).

TYPE: Near Rahala, along the route to Rohtang Pass, Kulu Valley, Western Himalayas, Himachal Pradesh, India, 2700 m, 8 Oct 1964, S. S. Bir (PAN 5241).

PARATYPES:

INDIA: Himachal Pradesh: Rohtang Pass, Kulu Valley, western Himalayas, 5400 m, 8 Oct 1964, S. S. Bir (PAN 5242). Kashmir: Chandanwari, 2700 m, July 1959, T. N. Khoshoo (PAN 2406, 2407).

Tibet: Dirankphu, Dolma la, along the route to Mount Kailash, 3000 m, 21 July 1956, R. S. Pathania (PAN 2408, 2409).

The chief feature of this form which distinguishes it from f. *fragilis* is the spores, which are echinate in f. *fragilis* and granulose-warty in f. *granulosa*. The spores, which Bir and Trikha (1973) considered rugose-verrucose, are redefined here as granulose in the light of SEM studies of Jeremy and Harper (1971) on the spores of the *C. fragilis* complex in Europe.

* Department of Botany, Punjabi University, Patiala 147002, India.

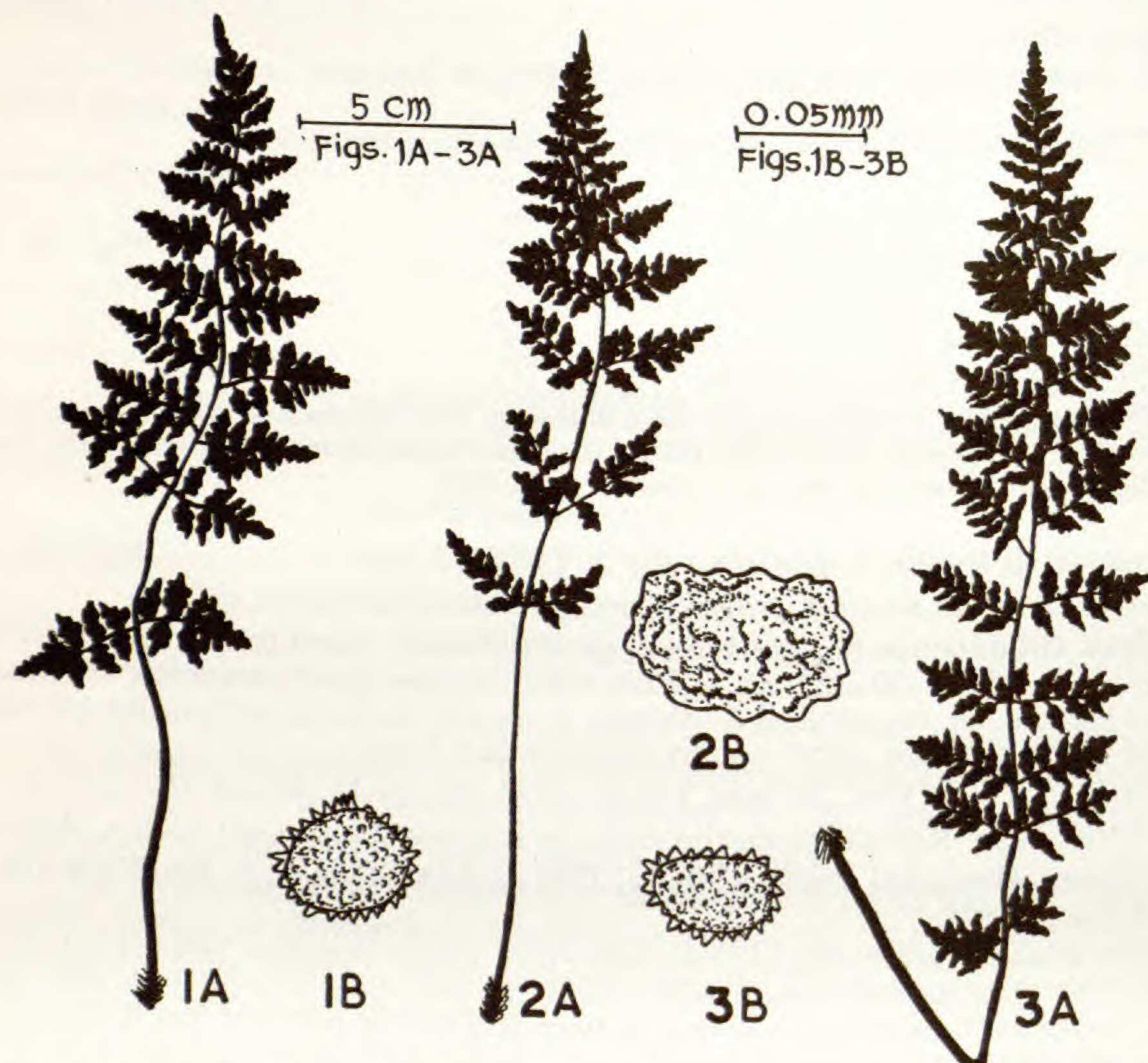
3. *Cystopteris fragilis* f. *himalayensis* Bir & Trikha, f. nov. Figs. 3A, B.

A *Cystopteride fragili* f. *fragili* pinnulis anguste oblongis apice acutis lobis dentatis acutis differt.

Pinnae broadly lanceolate, the pinnules narrow, oblong with an acute tip, cut ca. $\frac{1}{4}$ to $\frac{1}{2}$ the way down to the costae into lobes with acute teeth; spores echinate.

ILLUSTRATIONS: Bir and Trikha (1973, pp. 14-15, figs. 8-9).

TYPE: Gulmarg, western Himalayas, Kashmir, India, 2700 m, July 1966, S. P. Khullar (PAN 5389).



FIGS. 1-3. Fronds and spores of *Cystopteris fragilis*. FIG. 1. Forma *fragilis*. FIG. 2. Forma *granulosa*. FIG. 3. Forma *himalayensis*.

LITERATURE CITED

- BIR, S. S. and C. K. TRIKHA. 1973. Taxonomy of the Indian species of *Cystopteris* (L.) Bernh. *Nova Hedw. Beih.* **47**: 1-21.
 BLASDELL, R. F. 1963. A monographic study of the fern genus *Cystopteris*. *Mem. Torrey Bot. Club* **21**: 1-102.
 JERMY, A. C. and L. HARPER. 1971. Spore morphology of the *Cystopteris fragilis* complex. *Brit. Fern Gaz.* **10**: 211-213.